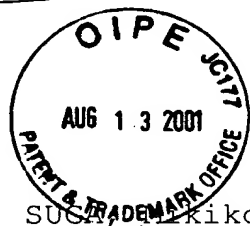


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SEQUENCE LISTING



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<120> ARGININE REPRESSOR DEFICIENT STRAIN OF CORYNEFORM BACTERIUM AND METHOD FOR PRODUCING L-ARGININE

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<141> 2001-04-17

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| Ser | Met | Val | Lys | Thr | Ser | Gln | Trp | Lys | Lys | Glu | Arg | Ala | Arg | Tyr | Gly |      |
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| Val | Glu | His | Thr | Tyr | Ser | Asp | Tyr | Glu | Val | Thr | Asp | Ser | Trp | Ala | Asn |      |
|     | 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |      |
| ggt | tgg | cac | ttg | cac | cgc | aac | atg | ctg | ttg | ttc | ttg | gat | cgt | cca | ctg | 1845 |
| Gly | Trp | His | Leu | His | Arg | Asn | Met | Leu | Leu | Phe | Leu | Asp | Arg | Pro | Leu |      |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| tct | gac | gat | gaa | ctc | aag | gcg | ttt | gag | gat | tcc | atg | ttt | tcc | cgc | tgg | 1893 |
| Ser | Asp | Asp | Glu | Leu | Lys | Ala | Phe | Glu | Asp | Ser | Met | Phe | Ser | Arg | Trp |      |
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| tct | gct | ggt | gtg | gtt | aag | gcc | ggt | atg | gac | gcg | cca | ctg | cgt | gag | cac | 1941 |
| Ser | Ala | Gly | Val | Val | Lys | Ala | Gly | Met | Asp | Ala | Pro | Leu | Arg | Glu | His |      |
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| Gly | Val | Lys | Leu | Asp | Gln | Val | Ser | Thr | Trp | Gly | Gly | Asp | Ala | Ala | Lys |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| atg | gca | acc | tac | ctc | gct | aag | ggc | atg | tct | cag | gaa | ctg | act | ggc | tcc | 2037 |
| Met | Ala | Thr | Tyr | Leu | Ala | Lys | Gly | Met | Ser | Gln | Glu | Leu | Thr | Gly | Ser |      |
|     | 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| gct | act | aaa | acc | gcg | tct | aag | ggg | tcg | tac | acg | ccg | ttt | cag | atg | ttg | 2085 |
| Ala | Thr | Lys | Thr | Ala | Ser | Lys | Gly | Ser | Tyr | Thr | Pro | Phe | Gln | Met | Leu |      |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
| gat | atg | ttg | gcc | gat | caa | agc | gac | gcc | ggc | gag | gat | atg | gac | gct | gtt | 2133 |
| Asp | Met | Leu | Ala | Asp | Gln | Ser | Asp | Ala | Gly | Glu | Asp | Met | Asp | Ala | Val |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| ttg | gtg | gct | cgg | tgg | cgt | gag | tat | gag | gtt | ggt | tct | aaa | aac | ctg | cgt | 2181 |
| Leu | Val | Ala | Arg | Trp | Arg | Glu | Tyr | Glu | Val | Gly | Ser | Lys | Asn | Leu | Arg |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |      |
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| Ser | Ser | Trp | Ser | Arg | Gly | Ala | Lys | Arg | Ala | Leu | Gly | Ile | Asp | Tyr | Ile |      |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| gac | gct | gat | gta | cgt | cgt | gaa | atg | gaa | gaa | gaa | ctg | tac | aag | ctc | gcc | 2277 |
| Asp | Ala | Asp | Val | Arg | Arg | Glu | Met | Glu | Glu | Glu | Leu | Tyr | Lys | Leu | Ala |      |
|     | 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |
| ggt | ctg | gaa | gca | ccg | gaa | cgg | gtc | gaa | tca | acc | cgc | gtt | gct | gtt | gct | 2325 |
| Gly | Leu | Glu | Ala | Pro | Glu | Arg | Val | Glu | Ser | Thr | Arg | Val | Ala | Val | Ala |      |

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|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------|-----|-----|-----|-----|--|------|--|--|--|--|--|
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| Leu  | Val | Lys | Pro | Asp | Asp | Trp | Lys | Leu | Ile | Gln | Ser                   | Asp | Phe | Ala | Val |  |      |  |  |  |  |  |
|  |     |     | 340 |     |     |     |     | 345 |     |     |                       |     | 350 |     |     |  |      |  |  |  |  |  |
| agg  | cag | tac | gtt | cta | gat | tgc | gtg | gat | aag | gct | aag                   | gac | gtg | gcc | gct |  | 2421 |  |  |  |  |  |
| Arg  | Gln | Tyr | Val | Leu | Asp | Cys | Val | Asp | Lys | Ala | Lys                   | Asp | Val | Ala | Ala |  |      |  |  |  |  |  |
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| Thr  | Pro | Cys | Met | Ile | Val | Met | Asp | Asp | Val | Asp | Leu                   | Asp | Ala | Val | Leu |  |      |  |  |  |  |  |
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| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Arg | Ala | Arg | Ala | Trp | Arg | Arg | Gln | Asn | Val | Met | Tyr | Lys | Ile | Thr | Asn |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Ser | Lys | Ala | Leu | Ala | Gly | Cys | His | Arg | Trp | Arg | Arg | Asp | Glu | Ala | Val |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Ala | Val | Ser | Trp | Ser | Ser | Asn | Gly | Ala | Ser | Gln | Phe | Glu | Gly | Leu | Gln |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Asn | Ser | His | Ser | Arg | Trp | Gly | Ser | Pro | Leu | Ala | Glu | Leu | Glu | Val | Met |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Gly | Glu | Arg | Arg | Ile | Glu | Leu | Ala | Ile | Ala | Thr | Lys | Asn | His | Leu | Ala |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Ala | Gly | Gly | Ala | Leu | Met | Met | Phe | Val | Gly | Thr | Val | Arg | His | Asn | Arg |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Ser | Gln | Ser | Phe | Ala | Gln | Val | Glu | Ala | Gly | Ile | Lys | Thr | Ala | Tyr | Ser |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
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|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Val | Glu | His | Thr | Tyr | Ser | Asp | Tyr | Glu | Val | Thr | Asp | Ser | Trp | Ala | Asn |  |
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|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Ser | Asp | Asp | Glu | Leu | Lys | Ala | Phe | Glu | Asp | Ser | Met | Phe | Ser | Arg | Trp |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
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|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Gly | Val | Lys | Leu | Asp | Gln | Val | Ser | Thr | Trp | Gly | Gly | Asp | Ala | Ala | Lys |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Thr | Tyr | Leu | Ala | Lys | Gly | Met | Ser | Gln | Glu | Leu | Thr | Gly | Ser | 225 | 230 | 235 | 240 |
| Ala | Thr | Lys | Thr | Ala | Ser | Lys | Gly | Ser | Tyr | Thr | Pro | Phe | Gln | Met | Leu | 245 | 250 | 255 |     |
| Asp | Met | Leu | Ala | Asp | Gln | Ser | Asp | Ala | Gly | Glu | Asp | Met | Asp | Ala | Val | 260 | 265 | 270 |     |
| Leu | Val | Ala | Arg | Trp | Arg | Glu | Tyr | Glu | Val | Gly | Ser | Lys | Asn | Leu | Arg | 275 | 280 | 285 |     |
| Ser | Ser | Trp | Ser | Arg | Gly | Ala | Lys | Arg | Ala | Leu | Gly | Ile | Asp | Tyr | Ile | 290 | 295 | 300 |     |
| Asp | Ala | Asp | Val | Arg | Arg | Glu | Met | Glu | Glu | Glu | Leu | Tyr | Lys | Leu | Ala | 305 | 310 | 315 | 320 |
| Gly | Leu | Glu | Ala | Pro | Glu | Arg | Val | Glu | Ser | Thr | Arg | Val | Ala | Val | Ala | 325 | 330 | 335 |     |
| Leu | Val | Lys | Pro | Asp | Asp | Trp | Lys | Leu | Ile | Gln | Ser | Asp | Phe | Ala | Val | 340 | 345 | 350 |     |
| Arg | Gln | Tyr | Val | Leu | Asp | Cys | Val | Asp | Lys | Ala | Lys | Asp | Val | Ala | Ala | 355 | 360 | 365 |     |
| Ala | Gln | Arg | Val | Ala | Asn | Glu | Val | Leu | Ala | Ser | Leu | Gly | Val | Asp | Ser | 370 | 375 | 380 |     |
| Thr | Pro | Cys | Met | Ile | Val | Met | Asp | Asp | Val | Asp | Leu | Asp | Ala | Val | Leu | 385 | 390 | 395 | 400 |
| Pro | Thr | His | Gly | Asp | Ala | Thr | Lys | Arg | Asp | Leu | Asn | Ala | Ala | Val | Phe | 405 | 410 | 415 |     |
| Ala | Gly | Asn | Glu | Gln | Thr | Ile | Leu | Arg | Thr | His |     |     |     |     |     | 420 | 425 |     |     |

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| ggtaagctgg cacgcatagc caagctaggc ggccaccaaa caccactaaa aattaatagt | 1140 |
| tcctagacaa gacaaacccc cgtgcgagct accaactcat atgcacgggg gccacataac | 1200 |
| ccgaaggggt ttcaattgac aaccatagca ctagctaaga caacgggcac aacatccgca | 1260 |
| caaactcgca ctgcgcaacc ccgcacaaca tcgggtctag gtaacactga aatagaa    | 1317 |
| gtg aac acc tct aag gaa ccg cag gtc aat gag ggt tct aag gtc act   | 1365 |
| Val Asn Thr Ser Lys Glu Pro Gln Val Asn Glu Gly Ser Lys Val Thr   |      |
| 1 5 10 15   |      |
| cgc gct agg gcg tgg cgt agg caa aac gtc atg tac aag atc acc aat   | 1413 |
| Arg Ala Arg Ala Trp Arg Arg Gln Asn Val Met Tyr Lys Ile Thr Asn   |      |
| 20 25 30  |      |
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| Ser Lys Ala Leu Ala Gly Cys His Arg Trp Arg Arg Asp Glu Ala Val   |      |
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| gcg gtg tcc tgg tcg tct aac ggt gct tcg cag ttt gag ggt ctg caa   | 1509 |
| Ala Val Ser Trp Ser Ser Asn Gly Ala Ser Gln Phe Glu Gly Leu Gln   |      |
| 50 55 60  |      |
| aac tct cac tct cgc tgg ggg tca tct ctg gct gaa ttg gaa gtc atg   | 1557 |
| Asn Ser His Ser Arg Trp Gly Ser Ser Leu Ala Glu Leu Glu Val Met   |      |
| 65 70 75 80   |      |
| ggc gaa cgc cgc att gag ctg gct att gct act aag aat cac ttg gcg   | 1605 |
| Gly Glu Arg Arg Ile Glu Leu Ala Ile Ala Thr Lys Asn His Leu Ala   |      |
| 85 90 95  |      |
| gcg ggt ggc gcg ctc atg atg ttt gtg ggc act gtt cga cac aac cgc   | 1653 |
| Ala Gly Gly Ala Leu Met Met Phe Val Gly Thr Val Arg His Asn Arg   |      |
| 100 105 110   |      |
| tca cag tca ttt gcg cag gtt gaa gcg ggt att aag act gcg tac tct   | 1701 |
| Ser Gln Ser Phe Ala Gln Val Glu Ala Gly Ile Lys Thr Ala Tyr Ser   |      |
| 115 120 125   |      |
| tcg atg gtg aaa aca tct cag tgg aag aaa gaa cgt gca cgg tac ggg   | 1749 |
| Ser Met Val Lys Thr Ser Gln Trp Lys Lys Glu Arg Ala Arg Tyr Gly   |      |
| 130 135 140   |      |
| gtg gag cac acc tat agt gac tat gag gtc aca gac tct tgg gcg aac   | 1797 |
| Val Glu His Thr Tyr Ser Asp Tyr Glu Val Thr Asp Ser Trp Ala Asn   |      |
| 145 150 155 160   |      |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| ggt | tgg | cac | ttg | cac | cgc | aac | atg | ctg | ttg | ttc | ttg | gat | cgt | cca | ctg | 1845 |
| Gly | Trp | His | Leu | His | Arg | Asn | Met | Leu | Leu | Phe | Leu | Asp | Arg | Pro | Leu |      |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| tct | gac | gat | gaa | ctc | aag | gca | ttt | gag | gat | tcc | atg | ttt | tcc | cgc | tgg | 1893 |
| Ser | Asp | Asp | Glu | Leu | Lys | Ala | Phe | Glu | Asp | Ser | Met | Phe | Ser | Arg | Trp |      |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| tct | gct | ggt | gtg | gtt | aag | gcc | ggt | atg | gac | gcg | cca | ctg | cgt | gag | cac | 1941 |
| Ser | Ala | Gly | Val | Val | Lys | Ala | Gly | Met | Asp | Ala | Pro | Leu | Arg | Glu | His |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
| ggg | gtc | aaa | ctt | gat | cag | gtg | tct | acc | tgg | ggt | gga | gac | gct | gcg | aaa | 1989 |
| Gly | Val | Lys | Leu | Asp | Gln | Val | Ser | Thr | Trp | Gly | Gly | Asp | Ala | Ala | Lys |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| atg | gca | acc | tac | ctc | gct | aag | ggc | atg | tct | cag | gaa | ctg | act | ggc | tcc | 2037 |
| Met | Ala | Thr | Tyr | Leu | Ala | Lys | Gly | Met | Ser | Gln | Glu | Leu | Thr | Gly | Ser |      |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| gct | act | aaa | acc | gcg | tct | aaa | ggg | tcg | tac | acg | ccg | ttt | cag | atg | ttg | 2085 |
| Ala | Thr | Lys | Thr | Ala | Ser | Lys | Gly | Ser | Tyr | Thr | Pro | Phe | Gln | Met | Leu |      |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     |     | 255 |     |      |
| gat | atg | ttg | gcc | gat | caa | agc | gac | gcc | ggc | gag | gat | atg | gac | gct | gtt | 2133 |
| Asp | Met | Leu | Ala | Asp | Gln | Ser | Asp | Ala | Gly | Glu | Asp | Met | Asp | Ala | Val |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| ttg | gtg | gct | cgg | tgg | cgt | gag | tat | gag | gtt | ggt | tct | aaa | aac | ctg | cgt | 2181 |
| Leu | Val | Ala | Arg | Trp | Arg | Glu | Tyr | Glu | Val | Gly | Ser | Lys | Asn | Leu | Arg |      |
|     |     | 275 |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |      |
| tcg | tct | tgg | tca | cgt | ggg | gct | aag | cgt | gct | ttg | ggc | att | gat | tac | ata | 2229 |
| Ser | Ser | Trp | Ser | Arg | Gly | Ala | Lys | Arg | Ala | Leu | Gly | Ile | Asp | Tyr | Ile |      |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| gac | gct | gat | gta | cgt | cgt | gaa | atg | gaa | gaa | gaa | ctg | tac | aag | ctc | gcc | 2277 |
| Asp | Ala | Asp | Val | Arg | Arg | Glu | Met | Glu | Glu | Glu | Leu | Tyr | Lys | Leu | Ala |      |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |
| ggt | ctg | gaa | gca | ccg | gaa | cgg | gtc | gaa | tca | acc | cgc | gtt | gct | gtt | gct | 2325 |
| Gly | Leu | Glu | Ala | Pro | Glu | Arg | Val | Glu | Ser | Thr | Arg | Val | Ala | Val | Ala |      |
|     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |     |      |
| ttg | gtg | aag | ccc | gat | gat | tgg | aaa | ctg | att | cag | tct | gat | ttc | gcg | gtt | 2373 |
| Leu | Val | Lys | Pro | Asp | Asp | Trp | Lys | Leu | Ile | Gln | Ser | Asp | Phe | Ala | Val |      |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |      |
| agg | cag | tac | gtt | cta | gat | tgc | gtg | gat | aag | gct | aag | gac | gtg | gcc | gct | 2421 |
| Arg | Gln | Tyr | Val | Leu | Asp | Cys | Val | Asp | Lys | Ala | Lys | Asp | Val | Ala | Ala |      |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |      |

|   |      |
|---|------|
| gcg caa cgt gtc gct aat gag gtg ctg gca agt ctg ggt gtg gat tcc     | 2469 |
| Ala Gln Arg Val Ala Asn Glu Val Leu Ala Ser Leu Gly Val Asp Ser     |      |
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| acc ccg tgc atg atc gtt atg gat gat gtg gac ttg gac gcg gtt ctg     | 2517 |
| Thr Pro Cys Met Ile Val Met Asp Asp Val Asp Leu Asp Ala Val Leu     |      |
| 385 390 395 400   |      |
| cct act cat ggg gac gct act aag cgt gat ctg aat gcg gcg gtg ttc     | 2565 |
| Pro Thr His Gly Asp Ala Thr Lys Arg Asp Leu Asn Ala Ala Val Phe     |      |
| 405 410 415   |      |
| gcg ggt aat gag cag act att ctt cgc acc cac taaaagcggc ataaaccccg   | 2618 |
| Ala Gly Asn Glu Gln Thr Ile Leu Arg Thr His                         |      |
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| Val | Asn | Thr | Ser | Lys | Glu | Pro | Gln | Val | Asn | Glu | Gly | Ser | Lys | Val | Thr |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Ala | Arg | Ala | Trp | Arg | Arg | Gln | Asn | Val | Met | Tyr | Lys | Ile | Thr | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Lys | Ala | Leu | Ala | Gly | Cys | His | Arg | Trp | Arg | Arg | Asp | Glu | Ala | Val |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Val | Ser | Trp | Ser | Ser | Asn | Gly | Ala | Ser | Gln | Phe | Glu | Gly | Leu | Gln |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

|         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 50      |         | 55      |         | 60      |         |         |         |         |         |         |         |         |         |         |         |
| Asn 65  | Ser     | His     | Ser     | Arg     | Trp 70  | Gly     | Ser     | Ser     | Leu     | Ala 75  | Glu     | Leu     | Glu     | Val     | Met 80  |
| Gly     | Glu     | Arg     | Arg     | Ile 85  | Glu     | Leu     | Ala     | Ile     | Ala 90  | Thr     | Lys     | Asn     | His     | Leu 95  | Ala     |
| Ala     | Gly     | Gly     | Ala 100 | Leu     | Met     | Met     | Phe     | Val     | Gly 105 | Thr     | Val     | Arg     | His 110 | Asn     | Arg     |
| Ser     | Gln     | Ser 115 | Phe     | Ala     | Gln     | Val     | Glu 120 | Ala     | Gly     | Ile     | Lys     | Thr 125 | Ala     | Tyr     | Ser     |
| Ser     | Met 130 | Val     | Lys     | Thr     | Ser     | Gln 135 | Trp     | Lys     | Lys     | Glu     | Arg 140 | Ala     | Arg     | Tyr     | Gly     |
| Val 145 | Glu     | His     | Thr     | Tyr     | Ser 150 | Asp     | Tyr     | Glu     | Val     | Thr 155 | Asp     | Ser     | Trp     | Ala     | Asn 160 |
| Gly     | Trp     | His     | Leu     | His 165 | Arg     | Asn     | Met     | Leu     | Leu 170 | Phe     | Leu     | Asp     | Arg     | Pro 175 | Leu     |
| Ser     | Asp     | Asp     | Glu 180 | Leu     | Lys     | Ala     | Phe     | Glu 185 | Asp     | Ser     | Met     | Phe     | Ser 190 | Arg     | Trp     |
| Ser     | Ala     | Gly 195 | Val     | Val     | Lys     | Ala     | Gly 200 | Met     | Asp     | Ala     | Pro     | Leu 205 | Arg     | Glu     | His     |
| Gly     | Val 210 | Lys     | Leu     | Asp     | Gln 215 | Val     | Ser     | Thr     | Trp     | Gly     | Gly 220 | Asp     | Ala     | Ala     | Lys     |
| Met 225 | Ala     | Thr     | Tyr     | Leu     | Ala 230 | Lys     | Gly     | Met     | Ser     | Gln 235 | Glu     | Leu     | Thr     | Gly     | Ser 240 |
| Ala     | Thr     | Lys     | Thr     | Ala 245 | Ser     | Lys     | Gly     | Ser     | Tyr 250 | Thr     | Pro     | Phe     | Gln     | Met 255 | Leu     |
| Asp     | Met     | Leu     | Ala     | Asp     | Gln     | Ser     | Asp     | Ala     | Gly     | Glu     | Asp     | Met     | Asp     | Ala     | Val     |

260

265

270

Leu Val Ala Arg Trp Arg Glu Tyr Glu Val Gly Ser Lys Asn Leu Arg  
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Ser Ser Trp Ser Arg Gly Ala Lys Arg Ala Leu Gly Ile Asp Tyr Ile  
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Asp Ala Asp Val Arg Arg Glu Met Glu Glu Glu Leu Tyr Lys Leu Ala  
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Gly Leu Glu Ala Pro Glu Arg Val Glu Ser Thr Arg Val Ala Val Ala  
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Leu Val Lys Pro Asp Asp Trp Lys Leu Ile Gln Ser Asp Phe Ala Val  
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Arg Gln Tyr Val Leu Asp Cys Val Asp Lys Ala Lys Asp Val Ala Ala  
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Ala Gln Arg Val Ala Asn Glu Val Leu Ala Ser Leu Gly Val Asp Ser  
 370 375 380

Thr Pro Cys Met Ile Val Met Asp Asp Val Asp Leu Asp Ala Val Leu  
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Pro Thr His Gly Asp Ala Thr Lys Arg Asp Leu Asn Ala Ala Val Phe  
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Ala Gly Asn Glu Gln Thr Ile Leu Arg Thr His  
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&lt;213&gt; Artificial Sequence



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<223>

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|            |            |            |            |            |            |      |
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| acccaacgga | tgtggctgct | atcttcctcg | agccaatcca | gggtgaaacg | ggcgttggtc | 300  |
| cagcacctga | aggattcctc | aaggcagtg  | gcgagctgtg | cgatgagtac | ggcatcttga | 360  |
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| tcggtgcttg | tttggccact | ggccgtgcag | ctgaattgat | gacccagggc | aagcacggca | 540  |
| ccactttcgg | tggcaaccca | gttgcttggt | cagctgccaa | ggcagtgctg | tctgttggtc | 600  |
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| aggttgacgg | cgttgtagac | gtccgtggca | ggggcttgat | gttgggcgtg | gtgctggagc | 720  |
| gcgacgtcgc | aaagcaagct | gttcttgatg | gttttaagca | cggcgttatt | ttgaatgcac | 780  |
| cggcggacaa | cattatccgt | ttgacccgc  | cgctggtgat | caccgacgaa | gaaatcgcag | 840  |
| acgcagtcaa | ggctattgcc | gagacaatcg | cataaaggac | ttaaacttat | gacttcacaa | 900  |
| ccacagggtt | gccatttcct | ggctgatgat | gatctcacc  | ctgcagagca | ggcagagggt | 960  |
| ttgaccctag | ccgcaaagct | caaggcagcg | ccgttttcgg | agcgtccact | cgagggacca | 1020 |
| aagtccgttg | cagttctttt | tgataagact | tcaactcgta | ctcgtttctc | cttcgacgcg | 1080 |
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| tggcgcacct | acgcacacag | caatttccac | gccatggcgg | agacgtccac | tgtgccgctg | 1260 |
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| gctaacgacg gcgccatctt cctgcactgc cttcctgcct accgcggcaa agaagtggca  | 1740            |
| gcctccgtga ttgatggacc agcgtccaaa gttttc gatg aagcagaaaa ccgcctccac | 1800            |
| gctcagaaag cactgctggt gtggctgctg gccaccagc cgaggtaaga c atg tct    | 1857            |
|  | Met Ser         |
|  | 1               |
| ctt ggc tca acc ccg tca aca ccg gaa aac tta aat ccc gtg act cgc    | 1905            |
| Leu Gly Ser Thr Pro Ser Thr Pro Glu Asn Leu Asn Pro Val Thr Arg    |                 |
|  | 5 10 15         |
| act gca cgc caa gct ctc att ttg cag att ttg gac aaa caa aaa gtc    | 1953            |
| Thr Ala Arg Gln Ala Leu Ile Leu Gln Ile Leu Asp Lys Gln Lys Val    |                 |
|  | 20 25 30        |
| acc agc cag gta caa ctg tct gaa ttg ctg ctg gat gaa ggc atc gat    | 2001            |
| Thr Ser Gln Val Gln Leu Ser Glu Leu Leu Asp Glu Gly Ile Asp        |                 |
|  | 35 40 45 50     |
| atc acc cag gcc acc ttg tcc ccg gat ctc gat gaa ctc ggt gca cgc    | 2049            |
| Ile Thr Gln Ala Thr Leu Ser Arg Asp Leu Asp Glu Leu Gly Ala Arg    |                 |
|  | 55 60 65        |
| aag gtt cgc ccc gat ggg gga cgc gcc tac tac gcg gtc ggc cca gta    | 2097            |
| Lys Val Arg Pro Asp Gly Gly Arg Ala Tyr Tyr Ala Val Gly Pro Val    |                 |
|  | 70 75 80        |
| gat agc atc gcc cgc gaa gat ctc ccg ggt ccg tcg gag aag ctg cgc    | 2145            |
| Asp Ser Ile Ala Arg Glu Asp Leu Arg Gly Pro Ser Glu Lys Leu Arg    |                 |
|  | 85 90 95        |
| cgc atg ctt gat gaa ctg ctg gtt tct aca gat cat tcc ggc aac atc    | 2193            |
| Arg Met Leu Asp Glu Leu Leu Val Ser Thr Asp His Ser Gly Asn Ile    |                 |
|  | 100 105 110     |
| gcg atg ctg cgc acc ccg ccg gga gct gcc cag tac ctg gca agt ttc    | 2241            |
| Ala Met Leu Arg Thr Pro Pro Gly Ala Ala Gln Tyr Leu Ala Ser Phe    |                 |
|  | 115 120 125 130 |
| atc gat agg gtg ggg ctg aaa gaa gtc gtt ggc acc atc gct ggc gat    | 2289            |
| Ile Asp Arg Val Gly Leu Lys Glu Val Val Gly Thr Ile Ala Gly Asp    |                 |
|  | 135 140 145     |
| gac acc gtt ttt gtt ctc gcc cgt gat ccg ctc aca ggt aaa gaa cta    | 2337            |
| Asp Thr Val Phe Val Leu Ala Arg Asp Pro Leu Thr Gly Lys Glu Leu    |                 |
|  | 150 155 160     |
| ggt gaa tta ctc agc ggg cgc acc act taaagcgccc ctagttcaag          | 2384            |
| Gly Glu Leu Leu Ser Gly Arg Thr Thr                                |                 |
|  | 165 170         |

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| caaggaactt  | aaaatgaagg  | agcacacctc  | atgactaacc  | gcctcgttct  | tgcatactcc  | 2564 |
| ggcggctctg  | acaccactgt  | ggcaattcca  | tacctgaaga  | agatgattga  | tgggtgaagtc | 2624 |
| atcgcagttt  | ctctcgacct  | gggccagggt  | ggagagaaca  | tggacaacgt  | tcgccagcgt  | 2684 |
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Lys Val Thr Ser Gln Val Gln Leu Ser Glu Leu Leu Leu Asp Glu Gly  
 35 40 45

Ile Asp Ile Thr Gln Ala Thr Leu Ser Arg Asp Leu Asp Glu Leu Gly  
 50 55 60

Ala Arg Lys Val Arg Pro Asp Gly Gly Arg Ala Tyr Tyr Ala Val Gly  
 65 70 75 80

Pro Val Asp Ser Ile Ala Arg Glu Asp Leu Arg Gly Pro Ser Glu Lys  
 85 90 95

Leu Arg Arg Met Leu Asp Glu Leu Leu Val Ser Thr Asp His Ser Gly  
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Asn Ile Ala Met Leu Arg Thr Pro Pro Gly Ala Ala Gln Tyr Leu Ala

115

120

125

Ser Phe Ile Asp Arg Val Gly Leu Lys Glu Val Val Gly Thr Ile Ala  
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Gly Asp Asp Thr Val Phe Val Leu Ala Arg Asp Pro Leu Thr Gly Lys  
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Glu Leu Gly Glu Leu Leu Ser Gly Arg Thr Thr  
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